ZU-411 PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re the application of:

Norio KASHIWA, et al.

Serial No.: Unassigned Group:

Filed: Concurrently Examiner:

FOR: POLYMER AND PROCESS FOR PREPARING THE SAME

Date: March 26,2002

The Hon. Commissioner of
Patents and Trademarks
Washington, D.C. 20231

PRELIMINARY AMENDMENT

Sir:

Preliminary to examination, please amend the herewith filed application as follows:

IN THE CLAIMS

Please cancel claim 10 in its entirety and without prejudice.

Please amend claim 11 as follows, a marked-up copy of this claim is attached:

Claim 11 (Amended) The process for preparing a branched polyolefin as claimed in claim 12, wherein the polymerization is carried out continuously under at least two different polymerization conditions, and the polymerization includes

polymerization conducted under such condition that the yield of a polymer produced by the transition metal compound (B)

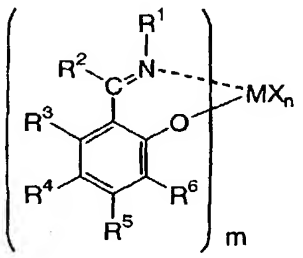
becomes higher than the yield of a polymer produced by the transition metal compound (A) and
polymerization conducted under such conditions that the yield of a polymer produced by the transition metal compound (A) becomes higher than the yield of a polymer produced by the transition metal compound (B).

Please enter the following new claims:

--12. (New) A process for preparing a branched polyolefin, comprising polymerizing at least one olefin selected from olefins of 2 to 20 carbon atoms using an olefin polymerization catalyst comprising:

(A) a transition metal compound containing a ligand having cyclopentadienyl skeleton,

(B) a transition metal compound represented by the following formula (I),



(I)

wherein M is a transition metal atom of Group 4 to Group 5 of the periodic table, m is an integer of 1 to 2, R^1 is an aliphatic hydrocarbon group or an alicyclic hydrocarbon group, R^2 to R^5 may

be the same or different and are each a hydrogen atom, a hydrocarbon group, a hydrocarbon-substituted silyl group, an oxygen-containing group, a nitrogen-containing group or a sulfur-containing group, R^6 is a hydrocarbon group or a hydrocarbon-substituted silyl group, n is a number satisfying a valence of M, X is a hydrogen atom, a halogen atom, a hydrocarbon group, an oxygen-containing group, a sulfur-containing group, a nitrogen-containing group, a boron-containing group, an aluminum-containing group, a phosphorus-containing group, a halogen-containing group, a heterocyclic compound residue, a silicon-containing group, a germanium-containing group or a tin-containing group, and when n is 2 or greater, plural groups indicated by X may be the same or different, and plural groups indicated by X may be bonded to form a ring, and

(C) at least one compound selected from:

(C-1) an organometallic compound,

(C-2) an organoaluminum oxy-compound, and

(C-3) a compound which reacts with the transition metal compound (A) or the transition metal compound (B) to form an ion pair.

13. (New) The process of claim 12, wherein the branched polyolefin prepared comprises 50 to 100 % by mol of recurring units derived from ethylene and 0 to 50 % by mol of recurring units derived from an α-olefin of 3 to 7 carbon atoms and having the following properties:

the flow activation energy (Ea (KJ/mol)) and the α-olefin content (C (% by weight)) satisfy the following relation:

in the case where the number of carbon atoms of the α-olefin is 3 and C ≥ 10 % by weight:

$$Ea \geq 0.130 \times C + 28.7,$$

in the case where the number of carbon atoms of the α-olefin is 4 to 7 and C ≥ 4.1 % by weight:

$$Ea \geq 0.385 \times C + 28.7,$$

in the case where the number of carbon atoms of the α-olefin is 3 and C < 10 % by weight (including the case where the α-olefin content is 0), and in the case where the number of carbon atoms of the α-olefin is 4 to 7 and C < 4.1 % by weight:

$$Ea \geq 30,$$

and

the melt tension (MT (g)) and the melt flow rate (MFR (g/10 min)) satisfy the following relation:

$$MT \leq 2.2 \times MFR^{-0.88}.$$

14. (New) The process of claim 12, wherein the branched polyolefin prepared comprises 50 to 100 % by mol of recurring units derived from ethylene and 0 to 50 % by mol of recurring units derived from an α-olefin of 8 to 20 carbon atoms and having the following properties:

the flow activation energy (Ea (KJ/mol)) and the α-olefin content (C (% by weight)) satisfy the following relation:

in the case of C ≥ 4.1 % by weight:

$$Ea \geq 0.385 \times C + 28.7,$$

in the case of $C < 4.1$ % by weight:

$$Ea \geq 30,$$

and

the melt tension (MT (g)) and the melt flow rate (MFR (g/10 min)) satisfy the following relation:

$$MT \leq 2.2 \times MFR^{-0.88}.$$

15. (New) The process of claim 12, wherein the branched polyolefin produced comprises,

(i) recurring units derived from at least one olefin selected from olefins of 2 to 20 carbon atoms, and

(ii) recurring units derived from a vinyl-terminated macromonomer comprising 50 to 100 % by mol of recurring units derived from ethylene and 50 to 0 % by mol of recurring units derived from an olefin of 4 to 20 carbon atoms, having a weight-average molecular weight of 600 to 200,000 and having less than 0.1 methyl branch, as measured by ^{13}C-NMR, based on 1,000 carbon atoms.--

REMARKS

Entry of the foregoing amendment prior to examination of this application is respectfully requested in view of the following comments.

Claim 10 has been cancelled, claim 11 has been amended

and new claims 12-15 have been added. Accordingly, claims 1-9 and 11-15 are pending in this application.

Claim 10 has been cancelled to eliminate an improper multiple dependency. New claim 12 corresponds to claim 10 rewritten in proper independent form and new claims 13-15 correspond to the improper multiple dependencies thereof rewritten in proper single dependent form.

Claim 11 has been amended to correct change its dependency from the cancelled claim 10 to new claim 12.

No new matter has been added and applicant respectfully submits that this application is in condition for allowance and an early notice to that effect is earnestly solicited.

Respectfully submitted,

Attorney for Applicants
Leonard W. Sherman
Reg. No. 19,636

SHERMAN & SHALLOWAY
P.O. BOX 788
Alexandria, Virginia 22313
(703) 549-2282

Norio KASHIWA, et al.
Serial No.: Unassigned
Docket No. ZU-411

Marked-Up Amended Claims

Claim 11 (Amended) The process for preparing a branched polyolefin as claimed in claim [10] 12, wherein the polymerization is carried out continuously under at least two different polymerization conditions, and the polymerization includes

polymerization conducted under such condition that the yield of a polymer produced by the transition metal compound (B) becomes higher than the yield of a polymer produced by the transition metal compound (A) and polymerization conducted under such conditions that the yield of a polymer produced by the transition metal compound (A) becomes higher than the yield of a polymer produced by the transition metal compound (B).